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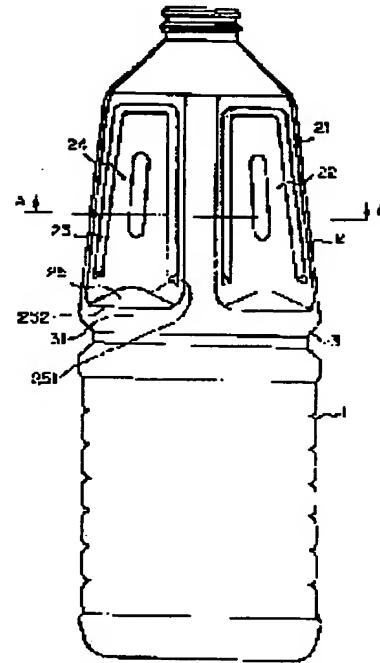
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FURUKAWA EIJI**(54) PLASTIC BOTTLE****(57)Abstract:**

**PURPOSE:** To obtain a plastic bottle which is excellent in buckling strength and has little distortion in an entire shape wherein irregular deformation due to a reduced pressure in the bottle can be prevented.

**CONSTITUTION:** A plastic bottle comprises a neck 3 formed between a cylindrical lower body 1 of a plastic bottle and a polygonal upper body 2, wherein a face 21 for forming the polygonal cylinder of the upper body 2 is sectioned by recesses 23 into shapes with a lower part opened while its inner side is a face 24 for reducing pressure, and an angled face 25 is formed at the lower end of the face 24 to be connected to the lower body 1 via the neck 3.



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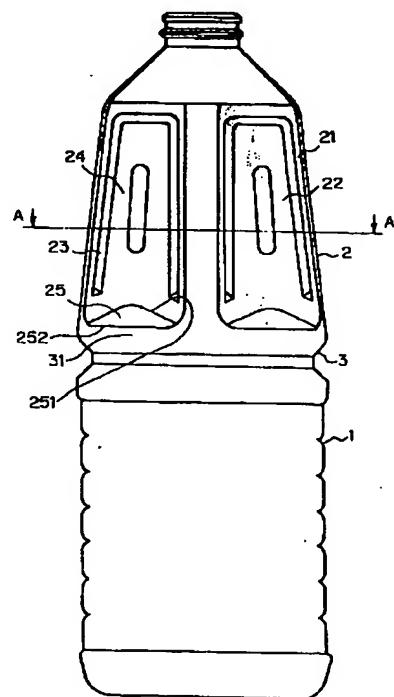
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(54) 【発明の名称】 プラスチックボトル

(57) 【要約】

【目的】 振幅強度に優れ、全体形状の歪みも少なく、ボトル内の減圧による不整変形を防止できるプラスチックボトルを提供する。

【構成】 プラスチックボトルの円筒形の胴下部1と、多角筒状の胴上部2との中間にくびれ部3を形成すると共に、前記胴上部2の多角筒状を形成する形成面21を凹溝23によって下方開放状に区切ってその内側を減圧面24となし、該減圧面24の下端には山形面25を形成し、くびれ部3を介して胴下部1に連続せしめたことを特徴とするプラスチックボトル。



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## 【特許請求の範囲】

【請求項1】 プラスチックボトルの円筒形の胴下部1と、多角筒状の胴上部2との中间にくびれ部3を形成すると共に、前記胴上部2の多角筒状を形成する形成面21を凹溝23によって下方開放状に区切ってその内側を減圧面24となし、該減圧面24の下端には山形面25を形成し、くびれ部3を介して胴下部1に連続せしめたことを特徴とするプラスチックボトル。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は挫屈強度に優れ、かつ、ボトル内の減圧により不整変形を防止し得るプラスチックボトルに関する。

## 【0002】

【従来の技術】 近年、プラスチックボトルが広く使用されるようになり、なかでもポリエチレンテレフタレートで代表されるポリエスチル樹脂等の耐熱性の比較的高いプラスチックボトルは、高温の液体を充填して密封する用途等に広く用いられている。そして上記用途では、高温で充填した液体等が、冷却するにつれて収縮してプラスチックボトルの内部の圧力が減少し、いわゆる減圧変形を生ずる。これを防止するため、例えば図5に正面図に示すようにプラスチックボトルの胴下部1は円筒形として、胴上部2は略多角筒状に形成し、多角筒の各面を周方向に複数配列形成して減圧変形吸収用としたものが提案されていた。

【0003】 しかし、上記従来のプラスチックボトルでは、たしかに減圧が生じたときに、各凹部が規則的に変形して減圧を吸収し、プラスチックボトルの不定変形を防ぐものであったが、上方向からの応力により、胴下部1と胴上部2との境界で挫屈するという問題があった。

## 【0004】

【発明が解決しようとする課題】 本発明は挫屈強度に優れていると共に減圧吸収効果にも優れたプラスチックボトルを提供することを目的とする。

## 【0005】

【課題を解決するための手段】 本発明は上記課題を解決しようとするもので、その要旨はプラスチックボトルの円筒形の胴下部1と、多角筒状の胴上部2との中间にくびれ部3を形成すると共に、前記胴上部2の多角筒状を形成する形成面21を凹溝23によって下方開放状に区切ってその内側を減圧面24となし、該減圧面24の下端には山形面25を形成し、くびれ部3を介して胴下部1に連続せしめたことを特徴とするプラスチックボトルにある。

【0006】 以下本発明を図面に基づきさらに詳細に説明する。

## 【0007】

【実施例】 図1は本発明のプラスチックボトルの一例を示す側面図、図2は図1の上面図、図3は図1のA-A

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断面図、図4は図2のB-B断面図である。

【0008】 本発明のプラスチックボトルは円筒形の胴下部1と多角筒状の胴上部2との中间にくびれ部3を形成してなり、胴上部2の多角筒状を形成する形成面21を凹溝23によって下方開放状、本例では略逆U字状に区切ってその内側を平坦状の減圧面24となし、該減圧面24の下端は図4に示すように裾線251を介して外方側に立上がりくびれ部3上の胴下部1の円筒状の上端31の円弧状の裾線252まで徐々に突出しながら連続し、図1に示すように裾線251が山形状をなす山形面25が形成されてなるものである。

【0009】 減圧面24は平坦状にしたり、緩やかな凹面にしたり、溝条や凸条で区切ったりして変形しやすく形成してあればよい。

【0010】 多角筒状の胴上部2により大きな減圧面24を形成できると共に、くびれ部3の補強効果により、プラスチックボトル全体の変形を防ぐことができる。

【0011】 凹溝23はヒンジの役割を果たし、その内側の減圧面24の変形をスムーズにすると共に長さ方向に補強効果を有するので減圧面24の波打ちや上下方向への応力による変形を防ぐ。

【0012】 凹溝23は逆U字状あるいは図示しないが両側平行縦線状とされ、下方開放状に区切っているので、減圧面24の下端に弱点となる水平凹溝ができず下方への応力を分散する効果がある。

【0013】 山形面25は図1に示すように、裾線251が下折りの山形を示しながら、図2、4に示すように平坦な減圧面24から胴下部上端31の円弧状の裾線252に徐々に突出しながら形状移行するので、下方への応力を分散しながら補強効果をも果たすので、前記逆U字状の凹溝と相まって、挫屈強度に優れるものである。 本発明のプラスチックボトルは例えば、図3に示すように、プロー成形型41、42の間に把手体5と共に加熱軟化したプリフォームを固定し、プリフォーム中に加圧空気を吹き込んでプローし、金型内面に押し付けると共に把手体5の一部に壁面を巻き付かせて一体化することにより製造することができる。

【0014】 図3に示すように各減圧面24を、プロー成形型41、42の合せ面43に対して45度の角度とすると共に、凹溝23を構成する谷面231を合せ面43に垂直にし、谷面232を合せ面43と平行に形成して、溝底角が90度の断面が三角形の凹溝23とすることにより、プロー成形後に製品を取り出すためにプロー成形型41、42を開くときに、谷面231がひつかることがないと共に、出来上がり品の凹溝23が深くなつて、断面三角形の各角部がそれぞれヒンジの効果を發揮して減圧面24の変形をスムーズにして減圧吸収効果が高まり、しかも左右対称形の断面三角形の凹溝23を得られるので外観的に優れているという効果がある。

【0015】

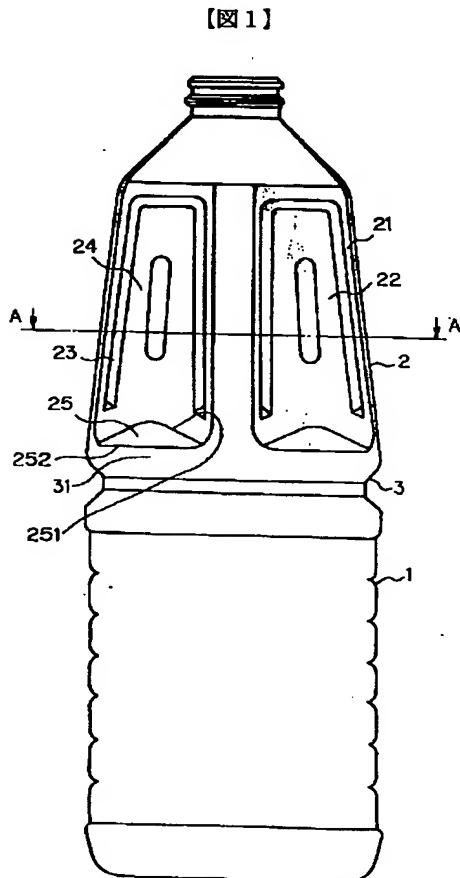
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【発明の効果】以上説明したように本発明のプラスチックボトルは円筒形の胴下部と多角筒状の胴上部との中間にくびれ部を形成すると共に、前記胴上部2の多角筒状を形成する形成面と凹溝によって下方開放状に区切ってその内側を減圧面としたので、ボトル内の減圧が生じても円滑に規則的な変形を生じてボトル内の減圧による不整変形を防止できる。さらに該圧面の下端には山形面を形成し、くびれ部3を介して胴下部に連続させたので、応力が分散して挫屈強度にも優れ、全体形状の歪みも少ないものである。

## 【図面の簡単な説明】

【図1】本発明のプラスチックボトルの一例を示す側面図。

【図2】図1の上面図。



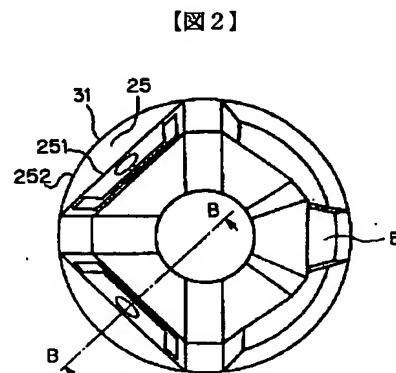
【図3】図1のプロー成形型中のA-A断面図。

【図4】図2のB-B断面図。

【図5】従来のプラスチックボトルの一例を示す側面図。

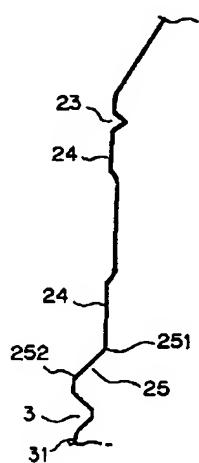
## 【符号の説明】

1	胴下部
2	胴上部
3	くびれ部
21	形成面
23	凹溝
24	減圧面
25	山形面
31	円筒状上端
251	裾線

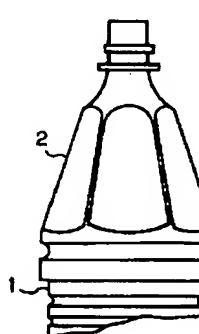
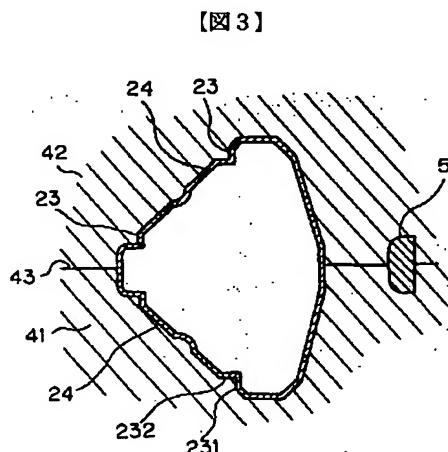


【図1】

【図2】



【図4】



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] While forming a neck 3 in the middle of the drum lower part 1 of the cylindrical shape of a plastics bottle, and the multiple tubed drum upper part 2. The plastics bottle characterized by dividing the forming face 21 which forms the multiple tubed one of said drum upper part 2 in the shape of lower part disconnection by the concave 23, having formed the crest form face 25 in the lower limit of the reduced pressure side 24, and the nothing and this reduced pressure side 24, and making the inside follow the drum lower part 1 through a neck 3.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention relates to the plastics bottle which is excellent in buckling reinforcement and can prevent undesirable deformation with the reduced pressure in a bottle.

**[0002]**

[Description of the Prior Art] In recent years, a plastics bottle comes to be used widely and heat-resistant, comparatively high plastics bottles, such as polyester resin represented with polyethylene terephthalate especially, are widely used for the application which fills up with and seals a hot liquid. And for the above-mentioned application, the liquid filled with an elevated temperature etc. contracts as it cools, the pressure inside a plastics bottle decreases, and the so-called reduced pressure deformation is produced. In order to prevent this, as shown in a front view at drawing 5, the drum lower part 1 of a plastics bottle formed the drum upper part 2 in abbreviation multiple tubed one as a cylindrical shape, and what carried out two or more array formation, and carried out each field of a multiple cylinder to reduced pressure deformation absorption in the hoop direction was proposed.

[0003] However, although each crevice deformed regularly, absorbed reduced pressure and prevented indeterminate deformation of a plastics bottle in the above-mentioned conventional plastics bottle when surely reduced pressure arose, there was a problem of carrying out buckling on the boundary of the drum lower part 1 and the drum upper part 2, with the stress from above.

**[0004]**

[Problem(s) to be Solved by the Invention] This invention aims at offering the plastics bottle excellent also in the reduced pressure absorption effect while it is excellent in buckling reinforcement.

**[0005]**

[Means for Solving the Problem] While this invention tends to solve the above-mentioned technical problem and the summary forms a neck 3 in the middle of the drum lower part 1 of the cylindrical shape of a plastics bottle, and the multiple tubed drum upper part 2. The forming face 21 which forms the multiple tubed one of said drum upper part 2 is divided in the shape of lower part disconnection by the concave 23, and it is in the plastics bottle which forms the crest form face 25 in the lower limit of the reduced pressure side 24, and the nothing and this reduced pressure side 24 for the inside, and is characterized by the drum lower part 1 carrying out ream continuation through a neck 3.

[0006] This invention is further explained to a detail based on a drawing below.

**[0007]**

[Example] The side elevation in which drawing 1 shows an example of the plastics bottle of this invention, and drawing 2 are [ the A-A sectional view of drawing 1 and drawing 4 of the plan of drawing 1 and drawing 3 ] the B-B sectional views of drawing 2.

[0008] The plastics bottle of this invention comes to form a neck 3 in the middle of the drum lower part 1 of a cylindrical shape, and the multiple tubed drum upper part 2. The forming face 21 which forms the multiple tubed one of the drum upper part 2 is divided into abbreviation inverted-L-shaped by the letter of lower part disconnection, and this example by the concave 23. The inside Flatness-like nothing [ the

reduced pressure side 24 and nothing ], It comes to form the crest form face 25 to which \*\*\*\* 251 makes a crest configuration as the lower limit of this reduced pressure side 24 is shown in drawing 4 , and it starts to the method side of outside through \*\*\*\* 251 and is gradually shown in drawing 1 in succession with a projection to \*\*\*\* 252 of the shape of radii of the upper limit 31 of the shape of a cylinder of the drum lower part 1 on a neck 3.

[0009] What is necessary is to make the reduced pressure side 24 into the shape of flatness, to make it into a loose concave surface, or to divide it by the chamfer or the protruding line, to be easy to deform and just to have formed it.

[0010] While being able to form the big reduced pressure side 24 by the multiple tubed drum upper part 2, the reinforcement effectiveness of a neck 3 can protect deformation of the whole plastics bottle.

[0011] A concave 23 plays the role of a hinge, and since it has the reinforcement effectiveness in the die-length direction while it makes smooth deformation of the reduced pressure side 24 of the inside, it prevents deformation by the stress to flapping and the vertical direction of the reduced pressure side 24.

[0012] Although not illustrated, since it considered as the shape of a both-sides parallel vertical line and has divided in the shape of lower part disconnection, a concave 23 has the effectiveness which inverted-L-shaped or the level concave used as a weak spot is not made in the lower limit of the reduced pressure side 24, but distributes the stress to a lower part.

[0013] Since the reinforcement effectiveness is also achieved distributing the stress to a lower part since the crest form face 25 carries out configuration shift with a projection gradually from the flat reduced pressure side 24 at \*\*\*\* 252 of the shape of radii of the drum lower upper limit 31 as shown in drawing 2 and 4 while \*\*\*\* 251 shows Yamagata of a bottom flare as shown in drawing 1 , it excels in buckling reinforcement conjointly with said inverted-L-shaped concave. Since the plastics bottle of this invention fixes preforming which carried out heating softening with the handle body 5 among the blow molding molds 41 and 42 and blows pressurization air into preforming as shown in drawing 3 , it is blown, and it can be manufactured by twining a wall surface round [ a part of handle body 5 ], and uniting with it while pushing against a metal mold inside.

[0014] As shown in drawing 3 , while making each reduced pressure side 24 into the include angle of 45 degrees to the mating face 43 of the blow molding molds 41 and 42 When the valley side 231 which constitutes a concave 23 is made perpendicular to a mating face 43, a valley side 232 is formed in parallel with a mating face 43 and the cross section whose groove bottom angle is 90 degrees considers as the triangular concave 23 In order to take out a product after blow molding, when opening the blow molding molds 41 and 42, while a valley side 231 is not caught The concave 23 of a completion article becomes deep, each corner of a cross-section triangle demonstrates the effectiveness of a hinge, respectively, deformation of the reduced pressure side 24 is made smooth, and a reduced pressure absorption effect increases, and since the concave 23 of the cross-section triangle of a bilateral symmetry form is moreover obtained, it is effective in excelling in appearance.

[0015]

[Effect of the Invention] Since the plastics bottle of this invention was divided in the shape of lower part disconnection and made the inside the reduced pressure side by the forming face and concave which form the multiple tubed one of said drum upper part 2 while it formed the neck in the middle of the drum lower part of a cylindrical shape, and the multiple tubed drum upper part as explained above, even if the reduced pressure in a bottle arises, smoothly regular deformation is produced and the undesirable deformation by the reduced pressure in a bottle can be prevented. Since the crest form face was furthermore formed in the lower limit of this pressure surface and the drum lower part was made to follow through a neck 3, stress distributes, it excels also in buckling reinforcement, and there is also little distortion of a whole configuration.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The side elevation showing an example of the plastics bottle of this invention.

[Drawing 2] The plan of drawing 1.

[Drawing 3] The A-A sectional view in the blow molding mold of drawing 1.

[Drawing 4] The B-B sectional view of drawing 2.

[Drawing 5] The side elevation showing an example of the conventional plastics bottle.

**[Description of Notations]**

1 Drum Lower Part

2 Drum Upper Part

3 Neck

21 Forming Face

23 Concave

24 Reduced Pressure Side

25 Crest Form Face

31 Cylindrical Upper Limit

251 \*\*\*\*

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